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## ABSTRACT

Learning strategies, a complex system of interrelated activities, are significantly related to the academic performance of disadvantaged students entering health-science education. The Revised Learning Strategies Inventory (RLSI) was used in conjunction with the Survey of Study Habits and Attitudes (SSHA) to investigate relationships between these two instruments and the academic performance of twenty-two disadvantaged students enrolled in a health-science summer enrichment program. All of the students were college graduates who were anticipating immediate entry into professional school. The group was composed of ten females and twelve males. There were seven Blacks, thirteen Whites, one Asian, and one Hispanic. Students completed the RLSI and SSHA during pre- and post-program assessment batteries. The pre-program administration of the instruments was not significantly related to academic performance (RLSI  $r = .031$ ; SSHA  $r = .046$ ). However, the post-program administration of the instruments was significantly related to academic performance (RLSI  $r = .335$ ; SSHA  $r = .251$ ). (Author/KH)

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Relationships Between Learning Strategies  
and Academic Performance of Disadvantaged Students

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## Abstract

Learning strategies, a complex system of interrelated activities, are significantly related to the academic performance of disadvantaged students entering health-science education. The Revised Learning Strategies Inventory (RLSI) was used in conjunction with the Survey of Study Habits and Attitudes (SSHA) to investigate relationships between these two instruments and the academic performance of twenty-two disadvantaged students enrolled in a health-science summer enrichment program. Students completed the RLSI and the SSHA during pre- and post-program assessment batteries. The pre-program administration of the instruments was not significantly related to academic performance (RLSI  $r = .031$ ; SSHA  $r = .046$ ). However, the post-program administration of the instruments was significantly related to academic performance (RLSI  $r = .335$ ; SSHA  $r = .251$ ).

Relationships Between Learning Strategies  
and Academic Performance of Disadvantaged Students

Successful academic performance in health-science education requires students to execute effective plans encompassing a complex system of interrelated activities. However, the plans and methods used during the first professional year are often a conglomeration of previously learned behaviors and the necessary alterations which accompany adaptation to the increased demands of professional education. These activities, collectively termed learning strategies, are different from learning styles and cognitive styles; these differences will be highlighted in the literature review. This paper reports on the relationships of the Revised Learning Strategies Inventory (RLSI), shown to be a valid indicator of first-year GPA for traditional medical students (Cleghorn & Saeger, 1983), with a group of minority or disadvantaged students who participated in a summer enrichment program for students interested in entering a health profession. The RLSI will be compared with the Survey of Study Habits and Attitudes (SSHA), a well-standardized study skills inventory. Both instruments will be correlated with the academic performance of the students in the program.

At first glance, it may appear that learning strategy training at the professional school level could be dispensed with, especially for students who have demonstrated successful undergraduate performance. However, our experience with health-science students at this institution is echoed by McPhall's comments: "One might assume that any student who has progressed far enough to gain acceptance to a medical college has

acquired proficiency in the areas of English, reading and study techniques. Such an assumption is, however, unsubstantiated" (1978, pp. 48-49). In fact, for several decades the literature has shown the need for learning skills training. Sheldon (1948) demonstrated the benefits of improving learning skills for medical students, but found that transfer of training was poor unless material directly applicable to medical courses was used. Shatin (1967) obtained a wide range of scores when he administered a study habits inventory to first-year medical students. Ambrosino, Brading, and Noval (1974) showed that reading deficiencies, along with nonproductive study habits, played a prominent role in medical school failure. Finally, Pinter (1983) emphasized that with disadvantaged groups "the most obvious characteristic interfering with success in health occupations programs is inadequate reading and study skills" (1983, p. 232).

In addition to such traditional learning skills programs, a more recent approach to remediation has been to modify students' cognitive processes, that is, to teach them how to think. The rationale behind the cognitive skills training approaches to remediation is that knowing how to think and learn is prerequisite to efficient and effective learning of specific content and skills (Arons, 1979; Belmont & Butterfield, 1971; Chiang & Atkinson, 1976; Rigney, 1978; Shavelson, 1974).

The confluence of the traditional behaviorally oriented study skills methods and the modern cognitive skills training systems has resulted in a chaotic mass of terminology. These terms will be defined and relevant instruments will be briefly illustrated to orient the reader. The most general term, learning style, has various definitions. Other terms are

learning preference, cognitive style, cognitive strategy, and learning strategy.

Keefe (1979) defines learning styles as characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment. Learning style and cognitive style have often been used synonymously in the literature; however Keefe considers learning style the broader term and includes cognitive with affective and physiological styles.

Plovnick (1975) considers learning styles as one aspect of cognitive style. He describes learning style as how one prefers to receive and use information in learning and problem-solving situations. His research and that of others (Donovan, Salzman, & Allen, 1972; Leonard & Harris, 1979; Sadler, Plovnick, & Snope, 1978; Irby, 1979) have shown learning styles to be related to medical specialty choices and to curricular preferences during the preclinical years. Plovnick (1975) used the Learning Styles Inventory developed by Kolb (1976). This inventory identifies four types of learners: accommodators (prefer to apply ideas actively in concrete settings), convergers (prefer to apply ideas actively in abstract settings), divergers (prefer to create ideas by reflecting upon their experiences in concrete settings), and assimilators (prefer to create ideas or hypotheses by reflecting upon abstract concepts). For example, Plovnick (1975) found that 40% of the accommodators and 54% of the convergers indicated they were dissatisfied with their course work at medical school, compared with 19% of the assimilators and divergers.

Irby (1979) defines learning styles as relatively constant attributes or preferences of an individual which interact with instructional circumstances in such a way as to produce differential learning as a function of those circumstances. He used the Learning Styles Inventory developed by Canfield (1976) and found that a majority of the medical preceptors felt that information on teaching and learning styles increased insight into their own clinical teaching and into resident and preceptor interaction.

The Grasha-Riechmann Student Learning Style Scales were developed to assess the following student learning styles: Independent, Dependent, Avoidant, Participant, Collaborative, and Competitive (Riechmann & Grasha, 1974). They found that students learn best in settings that meet their social-emotional needs and that are attuned to their predominant patterns of behavior.

Rezler and Rezmovic (1981) developed the Learning Preference Inventory to study student choice of one learning situation over another. They define learning style as the manner in which an individual perceives and processes information in learning situations. Their inventory yields scores for the following styles of learning: Abstract, Concrete, Individual, Interpersonal, Student-structured, and Teacher-structured.

Cognitive strategies have been defined by Rigney (1978) as the general operations and procedures that students may use to acquire, retain, and retrieve different kinds of knowledge and performance. Cognitive strategies involve representational capabilities of students (reading and imagery), selectional capabilities (attention and intention), and self-directional capabilities (self-programming and self-monitoring).

Several investigators have examined various aspects of these cognitive strategies. For example, Pask and Scott (1972) discuss two major types of cognitive competence. They are the holists who are global learners and the serialists who are step-by-step learners. Holists learn, remember and recapitulate a body of knowledge as a whole. Serialists learn information in terms of string-like cognitive structures where items are related by simple data links.

Marton and Säljö (1976a,b) also reported qualitative differences in cognitive strategies. Two different levels of processing were clearly distinguishable. First, a surface-level processing strategy is used by students who direct their attention towards rote-learning. Second, a deep-level processing strategy is adopted by students who study the intentional content of the learning materials.

Svensson (1977) found two different cognitive strategies which he describes as atomistic and holistic. The following summarizes these strategies with the two groups when learning from a textbook is required.

#### Atomistic Cognitive Strategy

- focusing on specific comparisons
- focusing on parts in sequence
- memorizing details
- memorizing direct information
- show a lack of orientation to the message as a whole
- remember introductory sequences
- visualize tables or outlines

#### Holistic Cognitive Strategy

- attempt to understand the overall meaning of the passage
- search for the author's intention
- relate the message to a wider context
- identify main parts and supporting facts
- remember the main message
- remember what author was trying to say
- learn the basic steps in the argument

Dansereau has pioneered efforts to emphasize the importance of learning strategies (Collins, Eiland, Spurlin, & Dansereau, 1982; Dansereau, Long, McDonald, & Actkinson, 1975; Dansereau, 1978; Dansereau et al., 1979). He has noted that by failing to stress learning strategies, "educators discourage students from developing and exploring new strategies, and, in so doing, limit students' awareness of their cognitive capabilities" (1978, p. 2). The benefits of a learning strategies approach are to be found in cognitive science and information processing theory and in the integration of assessment findings with specific intervention methods to improve academic performance. Collins et al. (1982) used Dansereau's Learning Strategies Inventory to attempt prediction of academic performance of medical students who were considered high risk. The results of this work are presently inconclusive due to the very limited number of subjects.

Maisiak et al. (1979) used the SSHA to examine possible predictors of academically at-risk entering medical students. The SSHA relationships were found to be low and nonsignificant with the first-year GPA and all individual course grades. They indicated that future research is needed if self-reported study skills are to be a viable construct in predicting academic difficulty for medical students. Vu and Galofre used the Inventory of Learning Processes (ILP) developed by Schmeck, Ribich and Ramanaiah (1977) to investigate the ways medical students learned. While the ILP has demonstrated reliability and validity, it was validated on undergraduate students. Its association with undergraduate GPA generated correlations of .23 and lower (Schmeck and Grove, 1979). This measure of association is lower than that for similar study habits scales for undergraduate students.

### Method

Subjects. Twenty-two students enrolled in the 1983 Health Careers Opportunity Program (HCOP) participated in the study. The HCOP was designed to reach minority and disadvantaged students interested in pursuing careers in the health sciences. All of the students were college graduates who were anticipating immediate entry into professional school. The group was composed of 10 females and 12 males. There were 7 blacks, 13 whites, 1 Oriental and 1 Hispanic.

Procedure and Instruments. During the first week of the summer program a six-hour assessment battery was administered to all subjects in group sessions. The RLSI and the SSHA were included in the battery. Both of these instruments were readministered during the post-program assessment battery.

#### Academic Aptitude Measures

1. Survey of Study Habits and Attitudes (SSHA). This 100-item inventory is a measure of study methods, motivation for studying, and attitudes toward important academic activities. The Study Orientation (SO) scale provides an overall measure of study habits and attitudes.

2. Revised Learning Strategies Inventory (RLSI). This 52-item inventory has been validated on a group of 270 medical students. It provides an overall score that measures a student's use of recommended learning strategies and the student's academic self-concept.

#### Academic Performance Measure

An academic performance measure was calculated according to the percentage of multiple-choice questions a student answered correctly

during the eight-week summer program. The total percentage correct represented 512 questions from weekly examinations in anatomy, embryology, microbiology, behavioral science and biochemistry courses.

Data Analysis. Scores on the pre- and post-program administrations of the RLSI and the SSHA were recorded for each student. At the conclusion of the program, the academic performance of each student was calculated. These variables were then intercorrelated to determine the relationships between learning strategies and academic performance.

### Results

Relationships Between Instruments. The correlations obtained between the RLSI and the SSHA were .451 ( $p < .01$ ) for the pre-program administration and .845 ( $p < .01$ ) for the post-program administration. The correlations obtained between the two administrations for each instrument were .473 ( $p < .01$ ) for the RLSI and .734 ( $p < .01$ ) for the SSHA.

RLSI and Academic Performance. The pre-program RLSI scores were not correlated with performance in the summer program ( $r = .031$ ); however, the post-program RLSI scores were significantly correlated with program performance ( $r = .335$ ;  $p < .01$ ). A difference score was calculated for each student to measure changes in pre- and post-program learning strategies. These difference scores were found to have the strongest association with academic performance in the program ( $r = .356$ ;  $p < .01$ ).

SSHA and Academic Performance. The pre-program SSHA Study Orientation scores were not correlated with performance in the summer program ( $r = .046$ ); however, the post-program SO scores were significantly correlated with program performance ( $r = .251$ ;  $p < .05$ ). A difference score was calculated for each student to measure changes in pre- and post-program SO scores. These difference scores were found to have the strongest association of the SO measures with academic performance in the program ( $r = .273$ ;  $p < .05$ ).

### Discussion

This study's most interesting finding is the consistency of the size of the correlations for pre-program, post-program, and difference scores between the Revised Learning Strategies Inventory and the Study Orientation scale of the Survey of Study Habits and Attitudes and the academic performance of students in the summer enrichment program. Both instruments were nonsignificant at the beginning of the program, but were significant when readministered at the program's conclusion. Finally, the difference scores showed the strongest relationships with the academic performance of the students.

Comparison of the two instruments test-retest reliability estimates showed the RLSI to be low ( $r = .473$ ) and the SSHA to be moderate ( $r = .734$ ). However, the lower reliability of the RLSI may be expected. In fact, it can be due to the changes in learning strategies which students made during the program. These changes were induced in part by an educational environment designed to simulate the intense learning demands of the health sciences and in part stimulated by a learning strategies training program during the summer. Students who adapted their learning strategies to meet these educational demands performed more successfully in the program's academic component. Due to this significant association between academic performance in biomedical science courses and the learning strategies instruments, at the end of the summer program, minority or disadvantaged students may be identified who may have academic problems during the first year of professional studies. This information can help to direct student support services to those at risk students during the regular academic year.

The positive association of the RLSI with academic performance is further evidence for the need to assess the learning strategies of health-science students; particularly minority or disadvantaged students who traditionally have been at risk in professional school.

The RLSI was shown to have a better relationship with academic performance in comparison to the SSHA. This may be influenced by two factors. First, the SSHA was designed for use with undergraduate students, particularly freshman and sophomores. The SSHA also contains several attitudinal questions that are not as relevant to professional education. Second, the RLSI was specifically focused to reflect the complex system of interrelated activities of health professions students successful academic performance in the health sciences.

Follow-up research is being conducted. First-quarter grades in anatomy, histology, embryology, and community and preventive medicine, as well as first-quarter GPA will be analyzed to determine relationships with the results of the summer program. Additionally, a follow-up questionnaire has been distributed to the students to obtain qualitative data on their reactions to the learning strategies training program components and how it may have influenced their academic performance.

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